The Nature of Resilience

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6,463 words

Abstract:

The advent of resilience strategies in the field of emergency planning and response has been premised on a profound re-evaluation of the referents of security governance. Together, the discovery of the 'myth' of panic and the natural resilience of populations has encouraged the spread of resilience strategies which aim to promote the adaptive and self-organizational capacities of populations in emergency. This chapter seeks to advance an alternative to this positivist explanation: that the appearance of 'resilient populations' is the correlate of a broader restructuring of rationalities and practices comprising liberal governance. Tracing the evolution of the figure of the natural underpinning liberal governmentalities through the historical development of Ecology and Economics, this chapter looks to make explicit the epistemological order supportive of neoliberal governance. In doing so, this chapter identifies the historical conditions of possibility for 'resilient populations' to emerge as a referent of governance.

Introduction

Panic has long figured as a principle consideration guiding strategies of emergency governance. Its spectacular fall from a core operational assumption organizing emergency response well into the final days of the Cold War to its current status within academic literatures as 'myth' (Clarke 2002; Cocking et al. 2009; Johnson 1985; Keating 1982; Sheppard et al. 2006; Tierney 2003; Wessely 2005) must therefore be regarded as a pivotal event in the history of emergency governance.

In stark contrast to the competitive, self-interested behaviour assumed to accompany emergencies, disaster researchers have documented the widespread cooperation—even altruism—which often manifests during disasters. Social norms, far from breaking down, not only continued to govern behaviour (Cocking et al. 2009; Sime 1983; Drury et al. 2009) but proved remarkably resilient with incidences of violence and crime often subsiding significantly (Auf der Heide 2004; Tierney 2003). To the extent that 'irrational behaviour', or panic, was witnessed, experts argued that these were in fact rational decisions based on imperfect knowledge within a rapidly unfolding event, which only appeared to onlookers as irrational (Tierney 2003). Panic, we are now told, is nothing more than a fallacious, culturally ingrained belief, perpetuated through its ubiquitous appearance in media portrayals of emergencies, but having no basis in reality (Clarke 2002; Tierney 2003). Disaster researchers have also noted the implications of this research on the organization, direction, and conduct of emergency response (Dynes & Drabek 1994; Manyena 2006). Government, within an unfolding emergency, should not look to direct, but to supplement and encourage the natural tendencies of those in emergency events to help themselves. Instead of withholding information, for fear of inciting panic, populations in emergency should be provided with all the information they require to self-organize an evacuation or response (Proulx & Sime 1991). People are to be encouraged, not directed; managed, not controlled.

The acknowledgement that panic is a 'myth' has lent support to the profound reorganization of UK emergency governance at the turn of the century. Departing radically from the disciplinary logic which guided British Civil Defence over the course of the Cold War, the resilience strategies of UK Civil Contingencies are instead oriented towards facilitating and optimizing the natural, self-organizational capacities, or 'resilience', of populations-in-emergency (Zebrowski 2009; Kaufmann 2013). The advent of resilience strategies within UK Civil Contingencies has thus been explained as the result of an improved conceptualization of the referents of security. But disaster research also serves to legitimise resilience strategies by premising the introduction of these policies on an empirically validated re-evaluation of collective human behaviour within emergency events. Indeed, resilience strategies are routinely celebrated as demonstrative of the growing humanism of emergency governance. Within these narratives, resilience enjoins the positivism of social science with the emancipatory project of liberalism: Knowledge of the nature of 'the social' permits less governance, less control and more 'freedom'.

This chapter seeks to advance an alternative to this positivist explanation: that the appearance of 'resilient populations' is an effect, rather the cause, of a broader restructuring of rationalities and practices comprising liberal governance. Such an explanation challenges the idea that resilience represents an objective 'discovery' of (social) science. Instead, resilient populations are taken to be a *particular* enframing of life forged and sustained through the repeated exercise of practices governance. Such an approach entails placing a priority on the constitutive effect of practices in shaping our understanding of the world around us. Moreover, it draws attention to the ontopolitical status of resilient populations as a referent of governance. To say that resilience is the correlate of neoliberalism does not mean that resilient populations are an illusion or a 'false' conception. On the contrary, such a claim invities critical inquiry into the processes through which resilient populations were rendered 'true', panic was deemed 'false', and the implications of this shift for the ways in which governmental power is exercised during emergencies.

This chapter aims to identify the conditions under which resilient populations could emerge as a referent of emergency governance. It does so by investigating transformations in the order of power/knowledge underpinning liberal governance. Our analysis begins by recognizing the importance which the 'natural' status of the market played in the historical genesis of liberalism as an art of governance. As disciplines with an authority on the composition of 'the natural', the historical co-evolution of Economics and Ecology is quickly traced with the aim of rendering explicit their common archaeological structure. Emphasis is placed on the function of equilibrium-based models (which persisted from classical studies of balance to the cybernetically-inflected discourses dominant in the period following the Second World War) in providing nature a telos and liberal governance an objective. C.S. Holling's resilience theory is next examined as a radical departure from classical equilibrium based models towards an atelic figure of nature composed of multiple, emergent equilibria. The simultaneous rearticulation of Ecology and Economics within the framework of the complexity sciences is taken as a profound shift in the order of 'the natural' enabling the development of novel forms of government. Turning to Hayek's appropriation of the complexity discourses in his later career, this study looks to identify the historical singularity of 'environmental' techniques of exercising power. Taken together, this novel account of nature coupled with environmental techniques of government is understood to forge a new regime of knowledge/power. The final section of this chapter accounts for the appearance of resilient populations as function of the emergence of this regime.

The nature of Nature

Before the term *oecology* was coined by German Darwinist Ernst Haeckel in 1866, references to the study of 'nature's economy' abounded. The phrase derived from Linnaeus' 1749 *The Oeconomy of Nature*: a study of the divine order visible within nature's design. In the late eighteenth century the term *oeconomy* still carried a connotation with household management—the original sense of the term from which it derives the prefix *oikos,* Greek for home or habitation. Thus, the title of Linnaeus' highly influential 1749 *The Oeconomy of Nature* referred to the transcendent Creator's

orderly design of nature rather than an allusion to 'political economy' in the contemporary sense. Early studies of nature's economy marvelled at the balance and harmony achieved by this divine design which paired ends with means down to the infinitely small detail (Worster 1994). Yet, while God's infinite attention to detail was a source of marvel, it provided a problem for translating nature into a model for human governance. While man could aspire to this level of management, it was only God, with his infinite wisdom, who could achieve such perfection in design.

Ecology,[1] which emerged as a field of study at the threshold of the late eighteenth and early nineteenth centuries, was to purge the idea of a transcendent ordering of nature by a divine Creator and replace it with a model of immanent self-ordering through competition. As is well known, Darwin credited Thomas Malthus for insights leading him to the theory of natural selection, which echoed economic notions of the invisible hand as a mechanism responsible for the immanent self-ordering of the market. However, the success of classical economic liberalism was similarly based on its success in articulating market mechanisms as 'natural'. In his lecture series *The Birth of Biopolitics* Foucault discusses how from the middle of the eighteenth century the market transitions from a site of jurisdiction against fraud—a significant risk between the sixteenth and seventeenth centuries—to a site of veridiction: 'a site and a mechanism for the formation of truth' (Foucault 2008, 30). Integral to this shift, Foucault argues, was the 'discovery' of the market's ability, when left to its own devices, to generate a 'natural price': one which accurately represents the relation between costs of production and demand. The 'natural' status of the market was used to argue for the displacement of government intervention from ensuring justice within the market to limiting interference (and especially political interference) with these 'natural' mechanisms.

While references to ordered harmony faded as both fields became similarly conceptualized as sites of competition for scarce resources, the emphasis on balance would be preserved and given 'scientific' rigour within studies of market equilibrium. In his 1874 *Elements of a Pure Economics* Léon Walras provided the foundations for general equilibrium theory by outlining the basic equations for a general equilibrium model and advanced a proof for the existence of a solution (Walras 2003, 169). Moreover, Walras sought to specify how this solution would be arrived at through the 'natural' adjustment mechanisms which exist within a competitive market. Competitive markets arrived at equilibrium prices—those which perfectly coordinate aggregate demand with supply so as to clear the market—through a process of *tâtonnement* ('groping towards') (Walras 2003, 170). If prices were set under equilibrium levels, so as to render supply insufficient for demand, then prices would slowly climb as markets 'groped towards' equilibrium level, and vice versa. Through a process of 'sequential' tâtonnement markets would clear, one at a time, until prices converged at a general equilibrium. Likewise, destabilization of prices following an economic shock would be expected to adjust through tâtonnement back to equilibrium over time.

The natural tendency towards equilibrium was echoed at this time within ecological treatments of succession. By the turn of the twentieth century, ecology had become a prominent field, in large part due to its perceived insight into the integration of political and economic units which were used to inform strategies of social, and

[1] In 1893 it was decided by the International Botanical Congress to change the name of the field to our modern spelling 'ecology' (Worster, 1994)

especially colonial, administration (Anker 2001). It is not unsurprising then, that a primary area of study was ecological succession: the colonization of plant and animal communities within a given region over time. Succession was premised on the widespread assumption of progressive development of a biotic community, consisting of both animal and vegetal species. Of particular influence to the field were Fredric Clements' theories of succession—widely suspected of having been derived from his reading of sociologist, and social Darwinist, Herbert Spencer (Worster 1994; Anker 2001; Kwa 2002). Biotic communities were thought to progress from a relatively homogenous and undifferentiated community (in human terms: a hunter-gatherer society) to more heterogeneous 'complex' communities in which functions were harmonized into a functioning whole (modern European societies)—which for Clements, as for Spencer, functioned as a 'super-organism'. Increased harmonization of the whole would absolve the need for further adaptation, thus halting evolution at what Clements would term a climax community. A climax community refers to the ecological composition of this biotic (or human) community within the final stage in its development. The type of vegetation composing the climax stage—be it a forest, desert, marsh, grassland, or otherwise—was said to be predefined by regional climatic variables such as temperature, rainfall and wind. While external shocks to an ecological community could disrupt this progression, nature would always rebound to continue its march through intermediary stages, known as *seres*, towards its climatically defined climax.

In 1935 Arthur Tansley outlined an inventory of systems based on the value of 'stability' (Tansley 1935). Stability was measured by the ability of a system to maintain its composure over time. The 'ecosystem', a term appearing for the first time in this paper in distinction to the 'biotic communities' and 'complex organisms' found in the holistic theories of Clements and Smuts, was a relatively unstable system given the range of factors both internal and external which could disrupt equilibrium. Yet the natural return of the system to equilibrium was assumed almost without question. "The universal tendency to the evolution of dynamic equilibria has long been recognized" and thus was provided no further explanation within the paper (Tansley 1935). Kwa has suggested that this self-evidence may be related to the widespread reference in explanations of life processes at the turn of the century to Le Chatelier's late nineteenth century experiments which demonstrated that endogenous shocks to a chemical equilibrium would be responded to by other factors so as to restore equilibrium (Kwa 2002, 33).

The scientification of ecology at this time was mirrored within the fields of economics. From the 1930's, Walrasian microeconomics would become more rigorously mathematicized as part of an overall trend in economics (Mirowski 2002, 7; Weintraub 2002). In the process, core concepts such as equilibrium, stability and the process of tâtonnement would be fundamentally reinterpreted (Weintraub 2002, 125). Tâtonnement would be rearticulated during this time to make it amenable to the ascendant neoclassical synthesis of Walrasian (microeconomic) theory and Keynesian (macroeconomic) theory, which effectively displaced a number of rival theories including Institutionalist, Marxist, and Austrian perspectives during this period (Hands 2009). Walrasian sequential tâtonnement would be replaced within the literature by Samuelson's version of tâtonnement which foregrounded speed of adjustment and more adequately accommodated Keynesian concerns regarding the 'stickiness' of some markets in adjusting to equilibrium including especially, labour markets. Keynesian

demand-management could thus be justified in assisting processes of tâtonnement to restore equilibrium in a more efficient and timely manner.

The common archaeological structure of the fields of ecology and economics from the time of their co-constitution was premised on a 'natural' telos towards a unique equilibrium following a systemic perturbation. The stability of systems to withstand shock—to move only incrementally away from equilibrium and return to it quickly thereafter—was recognized as a value with which to assess these systems and inform programmes of governance. The diagram of governance operating in relation to this ontologization of nature would operate a security logic of protection designed to protect systems from shocks in the first place and speed their return to equilibrium following a perturbation. This is what Holling would call 'engineering resilience' (Holling 1996), the security programme advocated by systems ecologists concerned with speedily restoring a presumed 'natural' equilibrium. It was in opposition to both this logic of security that Holling would advance the notion of 'ecological resilience': a programme of governance which not only reinterpreted the telos of security, but offered a radical re-ontologization of nature rooted within the discourses of the complexity sciences.

Transforming Nature

In the 1950's Clements' theory of a climax community would be refigured, but essentially preserved, as functional homeostasis when ecology was translated into the discourse of cybernetics. The ecosystem, understood as a cybernetic system, responded to destabilizing exogenous shocks through feedback mechanisms which would return the system to a pre-defined equilibrium state. Written in response to these models C.S. Hollings' highly influential *Resilience and Stability of Ecological Systems* would challenge the notion that nature was itself organized around a unique 'natural' equilibrium and, with it, challenge the long established belief in nature's telos (Holling 1973). In doing so, Holling would draw on developments in third-wave cybernetics associated with chaos, complexity and self-organizing autopoietic systems in order to advance a security programme for ecosystemic sustainability which he would term 'resilience.'

Specifically, Holling took issue with the cybernetically-grounded 'systems ecology' of brothers Eugene and Howard (Tom) Odum. Inspired by the writings of Alfred Lotka on the energetics of evolution, the brothers' work used systems analysis to study the function of energy flows within a system (Odum 1953; Patten & Odum 1981; Odum 1983). In the process, Tansley's notion of ecosystem would be reconceptualised as a cybernetic system progressively developing towards a climax-state of 'functional homeostasis'. In *The Strategy of Ecosystem Development* the idea of functional homeostasis is presented as both nature's telos and a security project: "In a word, the "strategy" of succession as a short-term process is basically the same as the "strategy" of long-term evolutionary development of the biosphere—namely, increased control of, or homeostasis with, the physical environment in the sense of achieving maximum protection from its perturbations" (Odum 1969, 262). Achieving "maximum protection", it is noted, may however conflict with man's emphasis on "maximum production"—an idea that is given further development by Eugene's brother Howard in *Environment, Power and Society* (Odum 1971). Here, H. T. Odum reflected on the

implications of industrial-led growth for the sustainability of Western eco-systems, arguing that the depletion of fossil-based resources would demand a fundamental restructuring of economies along sustainable lines. Achieving such a programme would require a massive effort in the control engineering of economies with an eye to the natural limits of ecosystems (Cooper & Walker 2011, 6).

Holling's work would challenge the command and control approaches to ecosystem management advocated by systems ecologists, in favour of what he would term a resilience approach. Earliest mention of the concept appeared within *Resilience and stability of ecological systems* (Holling 1973). The paper immediately takes aim at quantitative approaches to ecosystem management, stating that the application of systems analysis to the study of ecosystems places an excessive emphasis on equilibrium which "may simply reflect an analytic approach developed in one area because it was useful and then transferred to another where it may not be" (Holling 1973, 1). Instead, questions of sustainability require a shift in "emphasis from the equilibrium states to the conditions for persistence" (Holling 1973, 2).

Over the course of the article, Holling progressively outlines a new ontology of ecosystems rooted in the discourse of complex adaptive systems. Critically, Holling dismisses the idea that ecosystems organize around a single equilibrium point to which a system will automatically return following systemic shock. Rather, the particular attractor around which a system is organized represents only one of a multitude of possible states, which emerge and disappear over time. A system will continue to organize around a particular attractor given the presence of feedback mechanisms related to levels of biodiversity. The range in which a system can operate whilst organizing around the same attractor is referred to as a stability domain. Stability domains themselves evolve over time, expanding or contracting based on the size and number of these feedback loops operating around an attractor. The gradual weakening of the feedback loops operating around an attractor, for example through the loss of biodiversity within an ecosystem, can make a system more fragile and susceptible to shocks that will transfer it out of its current stability domain, towards an attractor organised around different processes. Depending on the nature of the feedback cycles within a regime, a transition may either be gradual or sudden—which accounts for the non-linear phase shifts of a system over time.

Holling was eager to emphasize the implications of this new ontology of nature for ecosystem management. He criticized efforts to protect vulnerable populations through system stabilizing approaches focused on maintaining the system in an equilibrium state. Programmes based on maintaining an optimal level of a population, such as those of Maximum Sustained Yield or protectionist policies designed to eliminate competitors and predators, have had, in some documented cases, the unintended consequences of reducing the overall resilience of a system: "a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" (Holling 1973, 14). Eroding the resilience of a system would leave it more susceptible to even minor external perturbations—random events such as climactic change, fire or pollution—which could flip the system into another stability domain and potentially increase the risk of wholesale species extinction (Holling 1973, 9). According to Holling, for ecosystem management "the important point is not so much how stable they are within the domain, but how likely it is for the system to move from one domain into another and so persist in a changed configuration" (Holling 1973, 10). Going further, Holling

suggested that in many cases what appears to be an instability within a system, such as widely fluctuating population levels of a particular species, can in fact *contribute* to systemic resilience (Holling 1973, 16-17). Again, an overemphasis on stability within equilibrium-centred approaches should in fact be reconsidered and replaced by an approach which aimed to increase the resilience of a system through a study of the dynamics underlying its domain of attraction. In his concluding paragraph Holling characterized a resilience approach in terms of epistemological modesty, an acknowledgment of the limits of human understanding.

> A management approach based on resilience…would emphasize the need to keep options open, the need to view events in a regional rather than a local context, and the need to emphasize heterogeneity. Flowing from this would be not the presumption of sufficient knowledge, but the recognition of our ignorance; not the assumption that future events are expected, but that they will be unexpected. The resilience framework can accommodate this shift in perspective, for it does not require a precise capacity to predict the future, but only a qualitative capacity to devise systems that can absorb and accommodate future events in whatever unexpected form they may take (Holling 1973, 21).

Over the course of his career, Holling would develop and elaborate an approach to managing ecosystems composed of multiple, emergent equilibria. Departing from equilibrium-focused techniques focused on systemic stability, a resilience approach, as outlined by Holling, would focus on optimizing the conditions for persistence of a species or ecosystem. Enhancing a system's resilience could be achieved in two ways (Holling 1973). Firstly, one could attempt to move the system further away from a critical threshold that would send it towards an alternate attractor. However, positioning a system away from an attractor could come at the cost of systemic efficiency. Alternatively, resilience can be enhanced by expanding the stability domain around an attractor. As Gunderson and Holling have noted, this second solution—which seeks to engender resilience into a system—not only increases the capacity of a system to withstand the impact of potentially destabilizing shocks, but also permits the system to quickly and efficiently reorganise so as to capitalize on emerging opportunities (Holling et al. 2002, 76).

Security, within a resilience framework, was no longer a conservative enterprise. It was an opportunity to evolve. Governance, rather than maintaining systems around 'natural' equilibrium points through normative/disciplinary techniques, would be reoriented towards enhancing the conditions of a systems capacity for adaptive emergence. To appreciate the significance of this new programme for liberal governance we should now turn to examine associated developments which were occurring simultaneously in the field of Political Economy.

The Nature of Neoliberalism

A year after Holling's groundbreaking paper, Friedrich von Hayek was awarded the 1974 Nobel Prize in economics. In his acceptance speech, subsequently published under the title *The Pretence of Knowledge* (Hayek 1989), Hayek railed against the hubris of Keynesian 'scientistism' in the context of the ongoing international stagflation

crisis. Echoing Holling, Hayek charged economists with committing the 'scientistic error' of naively appropriating the mathematically rigorous models of the physical sciences without sufficient regard to the differences between the fields. The market, Hayek maintained citing prominent cyberneticist Warren Weaver to lend credibility to his assertion, displayed an 'essential complexity' which precluded mathematical modelling. Despite his earlier criticism of "slavish imitation of the method and language of science" (Hayek 1952, 15) by economists, Hayek would increasingly draw upon the discourses of complexity to articulate his understanding of the market and promote a form of neoliberal economic governance sensitive to the powerful self-organizing capacities of the market (Cooper & Walker 2011; Mirowski 1997; Mirowski 2007). Consistent with classical liberalism, Hayek interpreted the 'natural' status of the market to confer limits on the degree to which government could regulate and control its processes. Where Hayek's project increasingly diverged from classical articulations of liberalism over the course of his career was on the nature of the 'natural' itself.

Hayek singled out in his Nobel Prize speech the Club of Rome's report on *The Limits to Growth* (Meadows et al. 1972) as demonstrative of the status afforded to dubious science which transgressed the limits of what it could rightfully determine (Hayek 1989, 6). The report had received significant attention in light of its provocative thesis that the sustainability of exponential economic growth was untenable, with the limits to this trajectory likely to be reached within the century. The MIT research group behind the report applied systems analysis to computer models to extrapolate the interaction between population growth, industrialization, pollution, food production and resource depletion over time. Altering these variables across a range of possible future scenarios the MIT team concluded that the rate of depletion of the finite resources upon which industrial economies were based raised significant concerns about the limits to economic growth. Echoing the prescription of Howard Odum, the report suggested that "it is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future" (Meadows et al. 1972, 24) if economic growth was engineered along sustainable lines within a steady-state economy which respected ecological and biotic equilibria.

For Hayek, in such a complex field as the market, that which is important for study is rarely quantifiable. Yet, the scientific status afforded *prima facie* to quantitative studies had encouraged analysis of those factors which *can* be measured, regardless of their overall importance to the dynamics of the market. Even the positive correlation between aggregate demand and total employment may only be approximate, Hayek suggested. However, insofar as it is the only cause for which we have quantitative data it has been taken as a scientific truth despite the fact that it may only be partial explanation of more complex processes. What may, in fact, contribute more substantially to unemployment—namely, discrepancies between distribution of demand for goods and services and the allocation of labour and other resources mandated for production—cannot be demonstrated in relation to quantitative evidence and, as a result, had been ignored by policy-makers.

Just as policies of Maximum Sustainable Yield (MSY) had eroded the resilience of complex ecosystems over time, Hayek purported that Keynesian demand-management approaches have had a debilitating effect on the ability of the underlying economic system to adjust to misallocations in labour and capital—the real cause of high unemployment, according to Hayek. By pumping money into sectors of the economy which only yield temporary demand, policies of Keynesian demand-

management only delay necessary structural adjustment and breed dependency on a continual flow of state-finance—both of which only serve to increase inflation. What was required was instead a qualitative approach focused on optimizing the conditions for self-organization, adaptability and growth. Hayek would characterize this approach as environmental:

> "if man is to do more harm than good in his efforts to improve social order, he will have to learn that in this and in other fields where essential complexity of an organized kind prevails, he cannot acquire full knowledge which would make mastery of the events possible. He will therefore have to use what knowledge he can achieve, not to shape the results as the craftsman shapes his handiwork, but rather to cultivate growth by providing the appropriate environment, in the manner in which the gardener does this for his plants" (Hayek 1989, 7).

Environmental governance would invoke the nature of the market, in classical liberal fashion, to discourage interventionist state policies which might interfere with inherent processes of self-organization. However, in conceptualizing the market in terms of an open, complex adaptive system (see Mirowski 2002) Hayek would draw upon a fundamentally different understanding of nature than that which had been classically conceived in both the fields of Political Economy and Ecology. For Hayek, the complexity of the market required a displacement of government efforts from intervening upon the processes of the economy itself to optimizing the conditions for self-organization and adaptive evolution. As an open, complex system the economy evolved most effectively in far from equilibrium conditions and productively when liberated from the stagnating control of the interventionist state. As open systems, local economies, rather than being shielded from the wider economic environment through state finance, would need to be opened to it, in order to allow processes of adaptation and co-evolution to operate. Scholarship, in turn, would need to be conducted with requisite epistemological modesty, identifying the qualitative conditions in which the self-organization of the market is optimized.

In *The Birth of Biopolitics,* Foucault would recognize the singularity of the 'environmental technology' operationalised within a neoliberal governmentality (Foucault 2008, 259). These techniques, he would stress, were not the equilibrium-based mechanisms of disciplinary society based on a "standardizing, identificatory, hierarchical individualization" (Foucault 2008, 261). Rather, this is the

> "image, idea, or theme-program of a society in which there is an optimization of systems of difference, in which the field is left open to fluctuating processes, in which minority individuals and practices are tolerated, in which action is brought to bear on the rules of the game rather than on the players, and finally in which there is an environmental type of intervention instead of the internal subjugation of individuals" (Foucault 2008, 259-60).

The advent of environmental technologies coincided with the "massive withdrawal [of] the normative-disciplinary system" (Foucault 2008, 260). This is not a programme of standardization utilizing disciplinary technologies to structure the mentality of individuals in accordance with an ideal normality. Nor is it a programme of biopolitical regulation operating on the 'generality' of aleatory events which, though unpredictable in their individual occurrence, display a constancy at the mass-level of the population in relation to which regulatory mechanisms could be introduced to "to establish an

equilibrium, maintain an average, establish a homeostasis, and compensate for variations within this general population and its aleatory field" (Foucault 2003, 246). The idea of fixed norms and 'natural' equilibria, at the level of the individual and the population, are dispensed with entirely for an "environmentalism open to unknowns and transversal phenomena" (Foucault 2008, 261). Foucault's lecture notes conclude with a provocative question: "But does this mean that we are dealing with natural subjects? [*end of manuscript*]" (Foucault 2008, 261).

If environmental technologies operated in relation to a 'natural' subject this was not to suggest either that they proceeded from a more objective rendering of the political subject or that they are involved with emancipating the subject from processes of political subjectification. Rather, it was because human populations were now understood within the same 'natural' figure of the environment—characterized by non-linear emergent self-organization. This re-conceptualization would have implications for liberal governance. Ensuring the subject is capable of co-evolution with their environment cannot be achieved by structuring the mentality of the subject. Rather governance would be directed towards acting on the subject's environment: understood as an incentive structure and thus a condition of possibility for emergent norms and behaviours. Security could thus no longer attempt to protect the subject from threat if this meant closing them off from their milieu. Instead, security would have to proceed by exposing the subject more fully to their environment so as to optimise its governmental effects in encouraging innovation and, crucially, adaptation.

The Birth of Resilient Populations

We have now established how the discursive framework advanced within the complexity sciences coupled with the environmental techniques of governance associated with neoliberalism comprised a novel apparatus of power/knowledge. We may now account for the appearance of resilient populations as an effect of these transformations. Following Foucault, it is imperative to recognize how an order of power/knowledge 'marks out in reality that which does not exist and legitimately submits it to the division between true and false' (Foucault 2008, 19). Priority is placed on the constitutive effect of practices in determining the objects of social science. Resilient populations as such must be regarded as a *particular* enframing of life which arose as the correlate to neoliberal governance. As an object constituted through the exercise of specific practices of governance, resilient populations cannot be said to properly 'exist' ontologically. Nor could they be discovered. They must instead be understood as the product of more obscure *ontopolitical* processes. This requires a shift in perspective—one which denies the existence of a fundamental logic underlying the 'being' of resilient populations, and instead attunes itself to the politics constitutive of resilient populations as a referent of governance. Resilient populations are simply the correlate of practices of governance; an interpretation of social behaviour determined by, and supportive of, neoliberalism.

These thoroughly *political* processes of objectification are what this chapter has sought to begin fleshing out. Given the immensity of the task, it would be impossible to exhaustively account for these processes here. Instead this final section will investigate

critical changes to the definition of panic which facilitated the appearance of 'resilient populations.

From the 1950s, substantial American military funding was being provided to researchers at The University of Chicago, the University of Maryland and the University of Oklahoma to investigate population behavior in civilian emergencies.[2] The military was interested in extrapolating the conclusions of these studies to understand how civilians react to crisis both to inform the design of domestic social controls and direct offensive strategies (Quarantelli 1987; Quarantelli 1990; Quarantelli 2004). The empirical research collected corroborated the evidence of earlier studies, including those of Mintz and Strauss, which had argued that the behaviour of populations in emergency was better characterized as rational action, rather than irrational hysteria, based on an individual's perception of their situation (see Mintz 1951; Strauss 1953). This proposition was assisted by E.L. Quarantelli's popular redefinition of panic as "actual (or attempted) physical flight" (Quarantelli 1957, 188) which, though more empirically verifiable, was quite obviously a radical departure from an understanding of panic in terms of irrational social hysteria. Panic, Quarantelli concluded, is 'a relatively uncommon phenomenon' which is 'over-exaggerated' in disaster literature (Quarantelli 1954, 275). To the extent that it does manifest,

> panic flight does not involve irrational thought if by that is meant anything in the way of faulty deductions from certain premises. From the position of an outside observer this may appear to be the case but, from a participant's viewpoint, given his limited perspective of only certain portions of the total situation, no such interpretation or irrationality can be made. For the fleeing of person, his action appears to him quite appropriate to the situation as he perceives it at that time (Quarantelli 1954, 272).

Significantly, Quarantelli warns that "[o]ne of the most important contributory conditions [to the onset of panic] is the existence of a social or group predefinition of a crisis as one that is likely to eventuate in panic flight" (Quarantelli 1954, 275).

While reminiscent of earlier studies which had investigating panic as a contagion, (Orr 2006; Pelling 2001; Forth 2001) Quarantelli's conception of panic displayed an important qualification. Panic's transmission mechanism would no longer be perceived in energetic terms as a contagious affect which by exciting the body served to undermine rationality, and by extension sociality, but in terms of an adaptive, rational response to information within a situation of perceived entrapment. This shift in the understanding of panic aligned with a broader trend in sociological research of the late 1950s in which notions of 'suggestibility' and 'contagion' were displaced by an emphasis on emergent norms and adaptive tendencies as explanations of collective behavior (Orr 2006, 128-134). This shift was indicative of the creeping influence of cybernetics and information theory within American sociology which would come to understand the maintenance of a stable social order as a function of information exchange.

Jackie Orr identified that by the 1970s sociological studies of panic appeared far less frequently and were being displaced by mounting psychological research on 'panic disorder': a condition characterised by recurrent panic attacks (a sudden, uncontrollable

[2]Detailed histories of this field of research are now provided by a number of sources (see Dynes & Drabek 1994; Quarantelli 1987; Quarantelli 1990; Quarantelli 1994; Quarantelli 2004)

onset of intense fear often accompanied by hyperventilation, perspiration, nausea, dizziness and heart palpitations) triggered by no observable cause (Orr 2006, 172-175). Assisted by Quarantelli's rigorous, but ultimately far narrower, definition of panic in terms of flight, the very idea of panic was itself being transformed alongside the general trend towards cybernetic thinking taking place within American sociology. No longer understood in terms of irrational hysteria, panic was now taken to be an adaptive response exhibited by a minority of individuals within a position of perceived entrapment. Combating this behavior required opening communication channels and assisting participants by providing them with information upon which to base their decisions.

Despite the mounting literature of disaster research, it was only at the turn of the twenty-first century that Disaster Research would affect a significant reorganization of emergency planning and response in Britain. True, the end of the Cold War provided an opportunity, giving impetus to a radical rethink of UK Civil Contingencies in light of the widespread acknowledgement that Civil Defence was poorly suited to the 'complex emergencies' and 'new security challenges' of the 21st century (Smith 2003, 414). But, this reorganization of UK Civil Contingencies also indicates an important event which is much more difficult to pinpoint—the passing of panic below a particular threshold of truth and the validation of 'resilient populations' as a referent object of emergency governance. What we can however begin to identify are the conditions within which such determinations could not be recognized as valid.

Conclusion

The resilience of populations in emergencies is often portrayed as the discovery of a natural phenomenon by disaster researchers. This chapter offers an alternative explanation with the aim of upsetting the predominance of this narrative. Resilient populations, I suggest, are not a socio-historical constant whose essence can be objectively determined and communicated by science. The appearance of resilient populations is the result of ontopolitical processes, rather than an objectively ontological discovery.

This chapter has sought to locate the conditions under which resilient populations could emerge as a conceptual object and referent of governance. It locates these conditions within transformations occurring in the order of power/knowledge supporting liberal governance. Specifically, this chapter demonstrated how the coupling of a novel account of nature produced by the complexity turn within the disciplines of Ecology and Economics with 'environmental' techniques of government constituted a novel apparatus of power/knowledge which underpins contemporary neoliberalism. Priority was placed on the constitutive effects of practices in rendering 'resilient populations' as an empirical object of social science and referent object of governance is an effect of neoliberal governance. As such, the conditions under which resilient populations could appear as a conceptual object were located not in the advance of (social) science, but in the ascendance of neoliberalism as a regime of governance.

Given the important role which panic played in enabling the disciplinary and biopolitical techniques of emergency governance historically, its current

problematization within resilience discourses must be regarded as a pivotal event in the history of emergency governance. But, of course, the exhaustiveness of this event should also not be overstated. Panic has proved to be a remarkably persistent idea. Indeed, the widespread assumption of panic within popular imaginaries of disaster has been identified as a recurrent obstacle to the spread of resilience strategies. Initiatives to enhance 'community resilience' have thus been accompanied by educational campaigns designed to raise public awareness of the fallacy of panic and promote good practice with regards to the governance of resilient populations(Challenger et al. 2009). In spite of these efforts, the assumption of panic remains widespread with references to panic continuing to be found even within UK emergency planning guidance (Drury et al. 2013). The persistence of panic should, I believe, alert us firstly to the fact that resilience discourses, while ubiquitous, are far from hegemonic. Panic is not simply a relic of the past, but something which continues to be manifest to the extent that disciplinary and biopolitical forms of government persist within the social field. The colonisation of this space itself represents a condition of possibility for the continued evolution and spread of resilience discourses.

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